Cisco Unified Border Element 1.3

Cisco® Unified Communications is a comprehensive IP communications system of voice, video, data, and mobility products and applications. It enables more effective, secure, and personalized communications that directly affect both sales and profitability. It brings people together by enabling a new way of communicating, where your business moves with you, security is everywhere, and information is always available whenever and wherever it is needed. Cisco Unified Communications is part of an integrated solution that includes network infrastructure, security, mobility, network management products, lifecycle services, flexible deployment and outsourced management options, end-user and partner financing packages, and third-party communications applications.

Product Overview

The Cisco Unified Border Element (Cisco UBE) is an intelligent unified communications network border element. Formerly known as the Cisco Multiservice IP-to-IP Gateway, the Cisco Unified Border Element, in addition to other Cisco IOS® Software features, includes session border controller (SBC) functions that help enable end-to-end IP-based transport of voice, video, and data between independent unified communications networks. SBCs are critical components for scaling unified communications networks from being “IP islands” within a single customer network to becoming an end-to-end IP community. One of the most significant uses of the Cisco Unified Border Element is to allow call control elements such as Cisco Unified Communications Manager to connect to service provider Session Initiation Protocol (SIP) trunks for public switched telephone network (PSTN) access offerings, generally known as SIP trunks. The Cisco Unified Border Element is an integrated Cisco IOS Software application that runs on the Cisco 2800 and 3800 Series Integrated Services Routers, the Cisco 7200 Series Routers, the Cisco 7301 Router, and the Cisco AS5350XM and AS5400XM Universal Gateways, Previous versions of the software also run on the Cisco 2600 Series Multiservice Platforms and Cisco 3700 Series Multiservice Access Routers. Today, the Cisco UBE is used as an IP-to-IP gateway by service provider, enterprise, and commercial customers to interconnect SIP and H.323 voice and video networks.

The Cisco Unified Border Element is a simple and cost-effective solution that provides a network-to-network demarcation interface for signaling interworking, media interworking, address and port translations, billing, security, quality of service (QoS), and bandwidth management. The Cisco Unified Border Element enhances the PSTN-to-IP functions of a traditional Cisco gateway by adding the capability to join two voice-over-IP (VoIP) or video communications networks without the need for the PSTN.

Cisco IOS Software helps enable the simultaneous operation of the following:

- Cisco Unified Border Element: An application that terminates and reoriginates both signaling (H.323 and SIP) and media streams (Real-Time Transport Protocol [RTP] and RTP Control Protocol [RTCP]) while performing border interconnection services between IP networks
- Cisco IOS Software H.323 Gatekeeper: An application that acts as the point of control for a variety of voice and video components that can be attached to an IP network such as IP

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telephony devices, IP-PSTN gateways, H.323 videoconferencing endpoints, and H.323 multipoint control units while facilitating buildout of large-scale multimedia service networks

- Cisco TDM Gateway: An application that allows time-division multiplexing (TDM) switching between TDM interfaces or TDM-to-IP interfaces

The Cisco Unified Border Element provides a great deal of functionality and services when interconnecting IP networks. Generally, these functions can be categorized into four basic areas; session management, the ability to count and manage the number of session flowing through a router; interworking, the ability to interconnect different signaling methods and variants; demarcation, the ability to act as a distinct demarcation point between the two networks; and security, the ability to act as a Layer 7 device that intelligently allows or disallows traffic between networks.

The Cisco Unified Border Element supports VoIP protocols such as H.323 and SIP. Video is also supported for both H.323 and SIP. Table 1 lists the features supported for voice as well as video.

Table 1. Cisco Unified Border Element Features

Feature	Support Details
Voice	
Protocols	• H.323 and SIP
Protocol and Signal Interworking	• H.323 to H.323 (including Cisco Unified Communications Manager) • H.323 to SIP (including Cisco Unified Communications Manager) • SIP to SIP (including Cisco Unified Communications Manager) • SIP to SIP (including Cisco TelePresence calls)
Media Support	• RTP and RTCP • Sub RTCP for Media Statistics
Media Interworking	SIP Delayed Offer to SIP Early Offer Interworking for Audio Calls
Media Modes	• Media flowthrough • Media flowaround
Transport Mode	• TCP • User Datagram Protocol (UDP) • TCP-to-UDP interworking
Fax Support	• T.38 Fax Relay • Fax Passthrough • Cisco Fax Relay
Modem Support	• Modem Passthrough • Cisco Modem Relay
Dual Tone Multifrequency (DTMF)	• H.245 Alphanumeric • H.245 Signal • RFC 2833 • SIP Notify • Key Press Markup Language (KPML) • Interworking capabilities: ◦ H.323 to SIP ◦ RFC 2833 to G.711 Inband DTMF* ◦ Various SIP to H.323 DTMF Interworking options
Supplementary Services	• Call Hold, Call Transfer, and Call Forward for H.323 networks using H.450 and transparent passing of Empty Capability Set (ECS) • SIP-to-SIP supplementary services (holds and transfers) support using REFER • SIP-to-SIP supplementary services (holds and transfers) support using REINVITE • H.323-to-SIP supplementary services for Cisco Unified Communications Manager with Media Termination Point (MTP) on the H.323 trunk

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Feature	Support Details
Interworking	• Configurable SIP Profiles to manipulate SIP messages • PAI, PPI and RPID Interworking**** • Unsupported MIME type attachment passthrough**** • Unsupported SIP Header passthrough****
Call Admission Control (CAC)	• Resource Reservation Protocol (RSVP) • Maximum number of calls per trunk (max calls) • CAC based on IP circuits • CAC based on total calls, CPU usage, or memory usage thresholds
OPTIONS SIP Message Support	• Support for responding to OPTIONS-PING messages • Support for generating in dialog OPTIONS-PING messages • Support for generating out of dialog OPTIONS-PING messages to control dialpeer status****
Virtual Route Forwarding (VRF) Support	Single-voice VRF support
Voice-Quality Statistics	Packet loss, jitter, and round-trip time
QoS	• IP Precedence and differentiated services code point (DSCP) marking
Network Address Translation (NAT) Traversal	• NAT Traversal support for SIP phones deployed behind non-Application Line Gateway (ALG) data routers • Stateful NAT Traversal
Network Hiding	• IP network privacy and topology hiding • IP network security boundary • Intelligent IP address translation for call media and signaling • Back-to-back user agent, replacing all SIP-embedded IP addressing
Number Translation	• Number translation rules for VoIP numbers • Electronic Numbering (ENUM) support for E.164 number mapping into Domain Name System (DNS)
Codecs	• G711 mu-law and a-law • G722 • G723ar53, G723ar63, G723r53, and G723r63 • G726r16, G726r24, and G726r32 • G728 • G729, G729A, G729B, and G729AB • Internet Low Bitrate Codec (iLBC)
Transcoding**	Transcoding between any two different family of codecs from the following list: • G711 a-law and mu-law • G.729, G.729A, G.729B, and G.729AB • G.723 (5.3 and 6.3 kbps) • iLBC • G722
Security	• IP Security (IPsec) • Secure RTP (SRTP) • Transport Layer Security (TLS) • Secure RTP to RTP Interworking****
Authentication, Authorization, and Accounting (AAA)	• AAA with RADIUS
Voice media applications	• Tool Command Language (TCL) scripts support for application customization • Voice Extensible Markup Language (VoiceXML 2.0) script support for application customization
Billing	Standard call detail records (CDRs) for accurate billing available through: • AAA records • Syslog • Simple Network Management Protocol (SNMP)
Lawful Intercept***	Provision of replicated packets to third-party mediation device

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Feature	Support Details
Video	
Protocols	H.323 and SIP
Cisco Endpoints Supported	• Cisco Unified Video Advantage (UVA), Cisco TelePresence
Rich Media	• Simultaneous support for data, audio, and video
Signaling INTERWORKING	• SIP Delayed Offer to SIP Early Offer Calls
Media	• Support for Multiplex RTP Calls (for Cisco TelePresence)
H.323 Enhanced Features	• H.235 Passthrough for Secure Calls • H.239 Passthrough for Picture in Picture
CAC	• RSVP, including audio and video reservation synchronization
QoS	• DSCP markings to prioritize video streams as they traverse the network
Data Support	• T.120 data collaboration flowaround only
Camera Control	• Far-end camera control (FECC)
Codecs	• H.261 • H.263 • H.264

* Requires digital signal processors (DSPs) and available only on Cisco 2600 Series Multiservice Platforms, Cisco 2691 Multiservice Platform, Cisco 3700 Series Multiservice Access Routers, and Cisco 2800 and 3800 Series Integrated Services Routers.
** Available on Cisco 2600 Series Multiservice Platforms, Cisco 3700 Series Multiservice Access Routers, Cisco 2800 and 3800 Series Integrated Services Routers, Cisco 2691 Multiservice Platform, and Cisco AS5350XM and AS5400XM Universal Gateways.
*** Available on Cisco 2851 and 3845 Integrated Services Routers, Cisco 7200 Series Routers, Cisco 7301 Router, and Cisco AS5350XM and AS5400XM Universal Gateways.
**** New feature for CUBE 1.3

New Features in Cisco Unified Border Element 1.3

The new additional features provided in the Cisco Unified Border Element 1.3 include;

- Support for configuration of SIP Parameters via DHCP
- Support for pass-through of unknown SIP Headers
- Support for pass-through of unknown MIME Body Attachments
- Support for interworking of PAI, PPI and RPID
- Support for generation of OPTIONS PING Messages to determine to status of dialpeers

Overall, the new capabilities of Cisco UBE 1.3 allow additional interoperability with more devices and more service provides as well as enhanced security options with Secure RTP to RTP interworking. Finally, the additional OPTIONS PING Messages flexibility result in enhanced reliability or Unified Communications solutions.

Primary Features and Benefits

The Cisco Unified Border Element delivers the following features and benefits:

- Network privacy by hiding the internal network structure from other administrative domains
- Capability to create interconnections between different VoIP network types (such as H.323-to-SIP interworking)
- DTMF interworking
- Capacity control and improved call routing control using carrier-based routing

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- Better voice quality, cost, and space savings (including rack density), and a feature set comparable to back-to-back gateways
- Codec filtering by restricting codecs advertised on outbound call legs; for example, restriction of high-bandwidth codecs is possible on the reorigination side of the Cisco Unified Border Element outbound dial peer
- Improved billing and settlement capabilities
- More control of calls routed between service providers and enterprises
- Software and hardware MTP functions for Cisco Unified Communications Manager (applies to Cisco 2800 and 3800 Series Integrated Services Routers only)
- Critical services provided at the edge of the network for scalability
- Support for changing codecs during rotary dial-peer selection
- Support for TDM voice
- Support for Lawful Intercept capabilities
- Support for PAI, PPI and RPID Interworking

Feature Availability

The Cisco Unified Border Element is built on Cisco IOS Software and runs on the following platforms:

- Cisco AS5400XM and AS5350XM Universal Gateways
- Cisco 7301 Router
- Cisco 7200VXR Series Routers
- Cisco 3800 Series Integrated Services Routers (Cisco 3825 and 3845 Integrated Services Routers)
- Cisco 2800 Series Integrated Services Routers (Cisco 2801, 2811, 2821, and 2851 Integrated Services Routers)

Older versions of the functionality are also available on the following routers:

- Cisco 2600 Series Multiservice Platforms (Cisco 2610XM , 2611XM, 2620XM, 2621XM, 2650XM, and 2651XM Multiservice Routers and the Cisco 2691 Multiservice Platform)
- Cisco 3700 Series Multiservice Access Routers (Cisco 3725 and 3745 Multiservice Access Routers)

A minimum of 64-MB flash memory and 256-MB DRAM is required, and a minimum of one Fast Ethernet port for an external interface is required.

The Cisco Unified Border Element may require additional hardware for connectivity to the PSTN and WAN and for transcoding capabilities. If connected to the IP network through a WAN connection, the Cisco Unified Border Element supports all the WAN connectivity methods and interface cards that the underlying router platform supports.

Note: For transcoding, one of the following products and appropriate DSPs is required:

- Cisco High-Density Voice Network Module (part numbers NM-HDV and NM-HDV-SERVERFARM)

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- Cisco IP Communications Voice/Fax Network Module (part numbers NM-HD-1V, NM-HD-2V, or NM-HD-2VE) on Cisco IP Communications High-Density Digital Voice/Fax Network Module (part numbers NM-HDV2, NM-HDV2-1T1/E1, or NM-HDV2-2T1/E1 and associated DSP cards PVDM2-8, PVDM2-16, PVDM2-32, PVDM2-48, and PVDM2-64)

More information about transcoding is available at http://www.cisco.com/en/US/products/ps5854/products_qanda_item0900aecd8016c2c7.shtml.

Note: The Cisco 7200 Series Routers and the Cisco 7301 Router do not support transcoding.

The Cisco IOS Software images listed in Table 2 allow the simultaneous operation of the Cisco Unified Border Element, the Cisco IOS Software H.323 Gatekeeper, and the Cisco TDM Gateway, all on the same device.

Cisco Unified Border Element with Configurable SIP Profiles

Configurable SIP Profiles on the Cisco Unified Border Element help customers by allowing SIP messages from entities in their network to pass through the border element and have header fields and the embedded SDP manipulated. This configurability allows for more endpoints to interconnect by acting as a middle layer to provide some interpretation. For example, if one network requires that a certain header be present in a SIP message, but your current SIP device, such as Cisco Unified CallManager, does not generate the header, the SIP profiles capability can be used to add this header.

Summary

The Cisco Unified Border Element provides direct IP interconnections with lower cost and greater flexibility than TDM interconnections. This gateway helps service providers and enterprises decrease VoIP latency, improve voice quality, and effectively support rich-media services, thereby allowing Cisco Unified Communications products to work transparently in both intrasite and intersite deployments.

Product Specifications

Table 2 shows platform memory specifications to support the Cisco Unified Border Element 1.3

Table 2. Platform Support and Product Specifications

Platform	Flash Memory	DRAM
Cisco 2851 Integrated Services Router **Cisco 2821 Integrated Services Router** **Cisco 2811 Integrated Services Router** **Cisco 2801 Integrated Services Router**	64 MB	256 MB
Cisco 3825 Integrated Services Router	64 MB	256 MB
Cisco 3845 Integrated Services Router	64 MB	256 MB
Cisco AS5350XM Universal Gateway	128 MB	512 MB
Cisco AS5400XM Universal Gateway	128 MB	512 MB
Cisco 7200 Series Routers	64 MB	1 GB
Cisco 7301 Router	64 MB	1 GB

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Ordering Information

This product is orderable in three simple steps:

1. Select a Cisco router based on performance requirements.
2. Select a Cisco IOS Software image with Cisco Unified Border Element feature support (all images above IPVoice support some components of Cisco UBE)
3. Select the appropriate Cisco IOS Software feature license.

To order software only, follow steps 2 and 3 and refer to Table 3 when selecting feature license part numbers.

To place an order, visit the Cisco Ordering homepage and refer to Table 3.

Table 3. Ordering Information for Feature Licenses

Part Number	Description
FL-CUBE-4(=)	Feature license applicable on any Cisco IOS Software platform for 4 simultaneous sessions
FL-CUBE-25(=)	Feature license applicable on any Cisco IOS Software platform for 25 simultaneous sessions
FL-CUBE-100(=)	Feature license applicable on any Cisco IOS Software platform for 100 simultaneous sessions
FL-INTVVSRV-2801(=)	Cisco 2801 Integrated Voice Video License: IP-to-IP Gateway
FL-INTVVSRV-2811(=)	Cisco 2811 Integrated Voice Video License: IP-to-IP Gateway
FL-INTVVSRV-2821(=)	Cisco 2821 Integrated Voice Video License: IP-to-IP Gateway
FL-INTVVSRV-2851(=)	Cisco 2851 Integrated Voice Video License: IP-to-IP Gateway
FL-INTVVSRV-3825(=)	Cisco 3825 Integrated Voice Video License: IP-to-IP Gateway
FL-INTVVSRV-3845(=)	Cisco 3845 Integrated Voice Video License: IP-to-IP Gateway
FL-GK-IPIP7200(=)	Cisco 7200 IP-to-IP Gateway
FL-GK-IPIP7301(=)	Cisco 7301 IP-to-IP Gateway
FL-INTVVSRV-5X(=)	Cisco AS5350XM & AS5400XM Integrated Voice Video License: IP-to-IP Gateway

To Download the Software

After ordering a feature license, visit the Cisco Software Center to download Cisco IOS Software. Table 4 provides the software image name and software feature set available with each platform.

Table 4. Cisco Unified Border Element Software Feature Set and Software File

Platform	Software Image Name	Software Feature Set
Cisco 2851 Integrated Services Router	c2800nm-adventerprisek9_ivs-mz	Cisco 2800 INT VOICE/VIDEO, IPIPGW, TDMIP GW AES
Cisco 2821 Integrated Services Router		
Cisco 2811 Integrated Services Router	c2800nm-ipvoice_ivs-mz	Cisco 2800 INT VOICE/VIDEO, IPIP GW, TDMIP GW
	C2800nm-ipvoice-mz	Cisco 2800 IP VOICE
Cisco 2801 Integrated Services Router	c2801-adventerprisek9_ivs-mz	Cisco 2801 INT VOICE/VIDEO, IPIPGW, TDMIP GW AES
	c2801-ipvoice_ivs-mz	Cisco 2801 INT VOICE/VIDEO, IPIP GW, TDMIP GW
Cisco 3845 Integrated Services Router	c3845-adventerprisek9_ivs-mz	Cisco 3845 INT VOICE/VIDEO, IPIPGW, TDMIP GW AES
	c3845-ipvoice_ivs-mz	Cisco 3845 INT VOICE/VIDEO, IPIP GW, TDMIP GW
Cisco 3825 Integrated Services Router	c3825-adventerprisek9_ivs-mz	Cisco 3825 INT VOICE/VIDEO, IPIPGW, TDMIP GW AES
	c3825-ipvoice_ivs-mz	Cisco 3825 INT VOICE/VIDEO, IPIP GW, TDMIP GW

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Platform	Software Image Name	Software Feature Set
Cisco 7200 Series Routers	c7200-adventerprisek9-mz	Cisco 7200 Series IOS ADVANCED ENTERPRISE SERVICES
	c7200-advipservicesk9_li-mz	Cisco 7200 Series IOS ADV IP SERVICES W/LAWFUL INTERCEPT
Cisco 7301 Router	c7301-adventerprisek9-mz	Cisco 7301 Series IOS ADVANCED ENTERPRISE SERVICES
	c7301-advipservicesk9_li-mz	Cisco 7301 Series IOS ADV IP SERVICES W/LAWFUL INTERCEPT
Cisco AS5350XM Universal Gateway	c5350-jk9su2_ivs-mz	Cisco AS5350 Series IOS INT VOICE/VIDEO IPIPGW, TDMIP GW LI
	c5350-js_ivs-mz	Cisco AS5350 Series IOS INT VOICE/VIDEO IPIPGW, TDMIP GW EPLUS
Cisco AS5400XM Universal Gateway	c5400-jk9su2_ivs-mz	Cisco AS5400 Series IOS INT VOICE/VIDEO IPIPGW, TDMIP GW LI
	c5400-js_ivs-mz	Cisco AS5400 Series IOS INT VOICE/VIDEO IPIPGW, TDMIP GW EPLUS

Cisco Unified Communications Services and Support

Using the Cisco Lifecycle Services approach, Cisco and its partners offer a broad portfolio of end-to-end services to support the Cisco Unified Communications System. These services are based on proven methodologies for deploying, operating, and optimizing IP communications solutions. Initial planning and design services, for example, can help you meet aggressive deployment schedules and minimize network disruption during implementation. Operational services reduce the risk of communications downtime with expert technical support, and optimize services enhance solution performance for operational excellence. Cisco and its partners offer a system-level service and support approach that can help you create and maintain a resilient, converged network that meets your business needs.

For More Information

For more information about the Cisco Unified Border Element, visit http://www.cisco.com/go/cube or contact your local Cisco account representative.

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